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Original Research

Can laparoscopic repair of inguinal hernia approach open repair that is the gold standard?

Standard of inguinal hernia repair

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Abstract

Aim: The open repair of inguinal hernia is still considered the gold standard. The current status of laparoscopic versus open hernia repair is still under debate. In this study, we compared laparoscopic and open inguinal hernia repairs performed by same surgeon on different patients.

Material and Methods: A total of 129 patients(155 hernias) who underwent inguinal hernia repair at Süleyman Demirel University Research and Application Hospital between January 2010 and January 2020 were evaluated retrospectively, and information about the techniques and their outcomes was collected.

Results: The incidence of Nyhus 3A hernias was higher in patients who underwent open surgery, while Nyhus type 2 hernias were more common in those who had laparoscopic surgery. The mean duration of hospitalization was 1.57 days. A total of, 23 complications (17.83% based on the number of patients) were observed. While the rate of right-sided hernias was higher in patients who underwent open repair, the rates of left-sided and bilateral hernias were higher in those who underwent laparoscopic repair. There was no significant relationship between the type of surgery and the presence or type of complication.

Discussion: The results of our study were generally consistent with the literature and proved that laparoscopic repair can be performed as safely as open repair. However, these techniques should be viewed as complementary. The best approach to an inguinal hernia repair depends on the specific expertise of the surgeon.

Keywords

Hernia, Mesh Repair, Open Inguinal Hernia Repair, Laparoscopic Inguinal Hernia Repair

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Introduction

Approximately 75% of hernias occur in the groin, making inguinal hernia repair one of the most common procedures performed by general surgeons. Many hernia repair techniques have been described, and there is no significant difference between the results of these techniques; moreover, the surgeon's habits and training play the greatest role in the choice of method.

The success of inguinal hernia surgery was evaluated by the recurrence rate. For effective and safe hernia repair:

1. The surgical technique should be suitable for each inguinal hernia.
2. The technique should be chosen with consideration of complications and recurrence rates.
3. The postoperative recovery time and patient comfort should be optimized.

The ultimate goal is to reduce postoperative pain, recovery time and recurrence rates. Understanding the anatomy of the groin can be challenging, and before performing inguinal hernia, surgeons should understand the anatomy of the groin to prevent complications such as reduced chronic pain and recurrence. The laparoscopic approach has been shown to have less postoperative pain and chronic pain and a faster recovery time in the general population. However, the laparoscopic technique has several limitations, including a long learning curve and the patient requiring general anesthesia [1, 2].

Retrospectively, 129 patients(155 hernias) operated on for inguinal hernia at Süleyman Demirel University Research and Application Hospital between January 2010-January 2020, 61 with the open tension-free method and 68 with laparoscopy(TAPP), were evaluated, and information about these techniques and their results was obtained.

Material and Methods

Study objectives

The records of a total of 129 patients who underwent open tension-free (61 patients) or laparoscopic TAPP (68 patients) surgery for inguinal hernia in our hospital between 2010 and 2020 were analyzed retrospectively via our hospital system and general surgery registration system. Patients were contacted by phone call or via hospital records. Comparisons of open and laparoscopic surgical methods were made in terms of age, sex, hernia location, hernia type according to the Nyhus classification, type of operation, length of hospitalization, follow-up period, pain, recurrence and other complications using the SPSS statistical program.

Statistical analysis

All the statistical analyses were performed using the SPSS version 17.0 program. The conformity of the variables to a normal distribution was examined using histogram plots and the Kolmogorov-Smirnov test. The mean, standard deviation, and median were used for descriptive analyses. Categorical variables were compared using the Pearson chi-square test. The Mann-Whitney U test was used to evaluate the differences in non-normally distributed(nonparametric) variables between two groups. P-values less than 0.05 were considered statistically significant.

Ethical Approval

This study is derived from a specialization thesis. This study was approved by the Ethics Committee of Süleyman Demirel University, Faculty of Medicine Clinical Research (Date: 2020-08-12, No: 236). Patients were not required to give their informed consent for inclusion in this retrospective study, as we used anonymous clinical data and because individuals cannot be identified according to the data presented.

Results

Demographic Data

To evaluate the results of laparoscopic (TAPP) and open (tension-free) repair operations, 155 hernia repairs were performed in a

Table 1. Type of Surgery and Hernia Localization

Hernia Localization	Open Surgery n (%) *	Lap Surgery n (%) *	Total n (%) **
Right	36 (% 59,02)	25 (% 36,76)	61 (47,29)
Left	18 (% 29,51)	24 (% 35,29)	42 (32,56)
Bilateral	7 (% 11,48)	19 (% 27,94)	26 (20,16)
Total	61 (%100)	68 (%100)	129 (%100)

*: Percentage of type of surgery and hernia localization
**: Percentage of total cases and hernia localization

Table 2. Types of Surgery and Nyhus Classification

Nyhus Classification	Description	Open n (%)	Laparoscopic n (%)	Total n (%)
Type 1	Indirect, Inner Ring Normal (pediatric)	-	-	-
Type 2	Indirect	18 (% 26,47)	51 (% 58,62)	69 (% 44,52)
Type 3A	Direct	30 (% 44,12)	27 (% 31,03)	57 (% 36.77)
Type 3B	Pants Hernia	13 (% 19,12)	5 (% 5,75)	18 (% 11,61)
Type 3C	Femoral Hernia	4 (% 5,88)	-	4 (% 2,58)
Type 4A	Direct hernia recurrence	2 (% 2,94)	3 (% 3,45)	5 (% 3,23)
Type 4B	Indirect Hernia Recurrence	1 (% 1,47)	1 (% 1,15)	2 (% 1,29)
Type 4C	Femoral Hernia Recurrence	-	-	-
Type 4D	Combined relapse	-	-	-
Total		68 (%100)	87 (%100)	155 (100%)

*: Type of surgery and percentage of Nyhus Classification
**: Percentage of total cases and Nyhus Classification

Table 3. Types of Surgery and Complications

Complications	Total n (%)**	Open Cer. n (%)*	Closed Cer. n (%)*	p
Complication	23 (%17,83)	10 (%16,39)	13 (%19,12)	0,687
Scrotal edema	3 (%2,33)	1 (%1,64)	2 (%2,94)	0,624
Hematoma	2 (%1,55)	1 (%1,64)	1 (%1,47)	0,938
Wound site infection	2 (%1,55)	2 (%3,28)	-	0,132
Seroma	4 (%3,10)	1 (%1,64)	3 (%4,41)	0,364
Agri	6 (%4,65)	1 (%1,64)	5 (%7,35)	0,124
Relapse	3 (%2,33)	1 (%1,64)	2 (%2,94)	0,624
Swelling	2 (%1,55)	1 (%1,64)	1 (%1,47)	0,938
Feeling numb	1 (%0,78)	1 (%1,64)	-	0,289
Combustion	2 (%1,55)	1 (%1,64)	1 (%1,47)	0,938
Urinary retention	2 (%1,55)	1 (%1,64)	1 (%1,47)	0,938

*: Types of surgery and complication rates
**: Total complication rates

total of 129 patients (119 males and 10 females). The male/female ratio was 9:1.

61 patients underwent open repair (tension free) and 68 patients underwent laparoscopic repair(TAPP).

In our study, the mean age was 56,2 ± 16,5 years (15-90). The mean age was 58,7 ± 16,5 years in patients who underwent open surgery, and the mean age was 53,9 ± 16,3 years in patients who underwent TAPP. There was no significant difference between the mean ages of patients who underwent TAPP and those who underwent open surgery (p = 0.124).

Of the 129 patients, 64 had at least one comorbidity, while no comorbidities were detected in 65 patients. Moreover, there was no significant difference between open surgery and laparoscopic surgery in terms of comorbidities.

Hernia Localization (Table-I)

Of the 129 inguinal hernia patients included in the study, 61 had right-sided hernias, 42 had left-sided hernias and 26 had bilateral hernias. However, the rate of bilateral inguinal hernias in laparoscopic surgery was approximately 3 times greater than that in open surgery (27,94% vs. 11,48%). The rate of right inguinal hernia was also greater in the open surgery group (59,02% and 36,76%).

Nyhus Classification (Table-II)

In this study, 155 hernia operations were performed on 129 patients. When all hernias in our study were evaluated, indirect inguinal hernia was the most common, direct inguinal hernia was the second most common hernia, and pants hernia was the third most common hernia (44,52%, 36,77% and 11,61%, respectively). The frequency of femoral hernia was very low (2,58%). The recurrence rates of direct and indirect hernias were 3,23% and 1.29%, respectively. When the Nyhus classification was analyzed according to the type of surgery:

• Among parients who underwent open surgery, direct inguinal hernia was the most common (44,12%), followed by indirect (26,47%) and third by trouser (19,2%) hernias.

• Among those who underwent laparoscopic surgery, indirect inguinal hernia was the most common (58,62%), direct hernia was the second most common (31,03%) and pant hernia was the third most common (5,75%).

Open surgery was performed for all femoral hernias(4 patients).

Length of stay

In our study, the mean duration of hospitalization was 1,50 days in the laparoscopic group (min:1, max:7) and 1,64 days in the open group (min:1, max:6 days). Moreover, there was no significant correlation between the type of surgery and the length of hospitalization.

Complications (Table-III)

The rate of complications according to the type of surgery is given in Table-III.

Discussion

According to the results obtained from our study, both patient groups were generally discharged on postoperative day 1 for open and laparoscopic inguinal hernia repair. There was no difference between the types of surgery in terms of the presence or types of complications. When both surgical techniques were analyzed, the recurrence rates, which are a measure of success of inguinal hernia repair, were similarly low and consistent with the literature.

According to these findings, laparoscopic repair is an effective and safe alternative to open tension-free repair, which is widely accepted as the gold standard for inguinal hernia repair.

In our study, the mean age was 56.2 years in general, 58.7 years in open surgery and 53.9 years in laparoscopic surgery. In the study by Koju et all., the mean age of patients who underwent Lichtenstein repair was 49.2 years and the mean age of patients who underwent TAPP was 44.3 years [3]. According to published studies, most inguinal hernias are observed at the age of 45 years and older [4]. In our study, the general age range and the greater mean age of patients who underwent open surgery were similar to those in the literature.

The main comorbidities found in the patients in our study were hypertension, diabetes mellitus, COPD, coronary disease and prostatism that like previous studies. However, there was no significant correlation between the surgical technique and the presence or types of comorbidities [5, 6]. Additionally, in our study, no intraoperative or postoperative problems related to CO2 insufflation developed in our patients who underwent TAPP.

In our study, 47.3% of the patients had right-sided inguinal hernias, 32.5% had left-sided inguinal hernias and 20.1% had bilateral inguinal hernias. In the literature, the incidence of right inguinal hernia is higher than that of left inguinal hernia.

In our study, the rate of bilaterality in laparoscopic surgery was approximately 3 times greater than that in open surgery (27.94% vs. 11.48%). The reason for this difference is that hernias that were not detected preoperatively were detected during laparoscopic surgery. In other words, some of the patients who underwent unilateral open surgery were bilateral. Evaluation the inner ring bilaterally is an advantage of the TAPP. There are different incidences of bilateral inguinal hernia in the literature and some studies have found an incidence of approximately 6% based on physical examination. In the same studies, 54% of right inguinal hernias were reported to be inguinal hernias, whereas 40% were left inguinal hernias [6]. Bilateral hernias were detected 20% more often by laparoscopy than by physical examination [5-7]. The advantage of the TAPP is that bilateral inguinal hernias can be diagnosed in patients with unclear clinical examination findings in addition to the diagnosis of contralateral hernias.

When all hernias in our study were evaluated, indirect inguinal hernia was the most common, direct inguinal hernia was the second most common hernia, and pants hernia was the third most common hernia (44.52%, 36,77%, 11.61%, respectively). The frequency of femoral hernia was very low (2.58%). The recurrence rates of direct and indirect hernias were 3.23% and 1.29%, respectively. These rates seem to be compatible with the literature [8].

When the Nyhus classification was analyzed according to the type of surgery, direct inguinal hernia (44.12%) was most common in patients who underwent open surgery, whereas indirect inguinal hernia (58.62%) was most common in patients who underwent laparoscopic surgery. Two possible reasons for this difference may be that direct inguinal hernia was more common in patients with more comorbidities, and open surgery was preferred more in patients with more comorbidities. Indeed, in our study, the rate of comorbidities was greater in those who underwent open surgery (54.10% - 45.59%, respectively).

Open surgery was performed for all femoral hernias (4 patients). Laparoscopic repair of femoral hernias is still in its infancy and although its results have been reported to be superior to those of open repair, open surgical treatment is still the standard of care for femoral hernias [9].

In our study, no significant difference was found in the length of hospitalization. Patients in both groups were generally discharged on postoperative day 1. However, the time to return to normal activity was significantly shorter in the laparoscopic group [10].

In our study, there was no significant relationship between the type of surgery in terms of the presence or type of complication. The overall complication rate was 17,8%. Although laparoscopic repair had a proportionally greater complication rate (19,2%) than open repair (16,4%) and the difference was not significant ($p = 0.687$). The rates given here are based on the number of patients (129 patients). When the rates are calculated on a case-by-case basis, the complication rates are slightly lower (155 patients).

Many studies have reported that laparoscopic inguinal hernia repair leads to less postoperative pain, lower rates of numbness, shorter recovery times and greater returns to normal activity than does the open technique. However, some studies have reported a greater complication rate with laparoscopic repair than with primary hernia repair. Some studies have reported no difference between the two methods in terms of complications, length of hospital stay or patient satisfaction.

In our study, the overall recurrence rate was 2.33%, while the recurrence rates were similar between open and laparoscopic repair. Several studies have reported high, recurrence rates, several studies have reported equal recurrence rates and several studies have reported low recurrence rates after laparoscopic hernia repair [11-14]. Inguinal hernia repair success is associated with long-term recurrence. In the literature, recurrence rates for inguinal hernia repair vary between 0%-3.4% for mesh repairs and between 2.9%-21% for non-mesh repairs [15]. These rates have been reported to be in the range of 1-2% for the TEP method and 0-3% for the TAPP method [16]. In our study, no significant difference was observed between the recurrence rates of the two methods, which was consistent with the literature.

In our study, the rate of chronic pain was slightly greater in patients who underwent laparoscopic repair, than in those who did not (7.35% vs. 1.64%, respectively). The cause of chronic pain in patients who underwent laparoscopic repair is thought to be due to the tacker placed on the anterior abdominal wall (nerve compression) or shrinkage of the prolene patch (inflammation).

It is accepted that pain may occur in the acute and chronic periods after inguinal hernia repair. However, the underlying causes and prevalence, duration of pain and social consequences of this pain have not been fully elucidated. Nerve compression or injury may be a pathogenic risk factor for both acute and chronic pain. This pain is caused mainly by stimulation of afferent nerves as a result of activation of skin and subcutaneous receptors [17, 18].

Studies chronic pain, affecting daily activities, have been reported to occur in 6–10%. To prevent nerve injuries, staples should not be placed below the iliopubic tract or lateral to the spermatic vessels [19, 20].

In our study, 2 wound infections were observed in patients who underwent open technique repair and these infections did not cause recurrence. No wound infections developed in the laparoscopic repair group. Cosmetically, patients who undergo laparoscopy experience complete disappearance or minimal scarring at the trocar entry sites.

In our study, the overall rate of seroma/hematoma was 4.65%. This rate was 3.28% in those who underwent open repair and 5,88% in those who underwent laparoscopic repair and no significant difference was found. In several large series, the rates were 13.6% and 16.4% for open and laparoscopic repair, respectively, and the rates of seroma and hematoma development in our study were lower than those in the literature [21].

Noninvasive scrotal edema, swelling, numbness, burning and urinary retention were similar in both groups. For each of these complications, the rates are low compared to those in the literature.

The hernia can be repaired with two main surgical treatment options: open surgery or laparoscopy. Hundreds of repair methods have been described in modern inguinal hernia surgery, which classically started with Bassini. The common aspect of these methods is that the herniated defect is reinforced with sutures despite the formation of tension. The high recurrence rates in hernia surgery and the fact that this high recurrence rate was caused by tension are important problems that require a solution. Although inguinal hernias are common enough to occur in 75% of all external hernias and in 4% of the population, the best repair method has not yet been determined. The success of inguinal hernia operation is evaluated by the recurrence rate. With this in mind, Lichtenstein initiated the development of the open-tension-free inguinal hernia operation in 1984. The aim is to reduce postoperative pain, the healing process and recurrence rates [22-24].

The next major change was the introduction of laparoscopic repair. Following the introduction of laparoscopic techniques in general surgery, the first minimally invasive inguinal hernia repair was reported in 1990 [25].

In conclusion, the success of inguinal hernia operation was evaluated by the recurrence rate. Although inguinal hernias are common enough to be seen in 3-8% of the population, the best method of surgery to be preferred has not yet been fully determined. The aim of hernia repair is to minimize postoperative pain, the healing process, the recurrence rate and other complications. The "Lichtenstein" tension-free graft hernia repair operation can be considered a method that reduces the patient's hospital stay, postoperative discomfort, recovery time and cost of hernia treatment in real terms. Since its introduction this method has been successfully applied by many surgeons worldwide.

In addition, as shown in our study, laparoscopic repair is as effective as open tension-free repair and there was no difference between these two techniques in terms of length of stay, pain, recurrence and other complications. This finding proves that laparoscopic repair can be performed as safely as open repair, although it is accepted that laparoscopic repair has a longer learning curve.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or compareable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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